Before the

Federal Communications Commission

Washington, D.C. 20554

Utilities Telecom Council and Winchester	)	
Cator, LLC	)	
Petition for Rulemaking to Establish Rules	)	RM-11429
Governing Critical Infrastructure Industry	)	
Fixed Service Operations in the 14.0–14.5	)	
GHz Band		
June 26, 2008		

Opposition by the Satellite Users Interference Reduction Group ("SUIRG")

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I. SUMMARY

The Satellite Users Interference Reduction Group (SUIRG) submits the present comments to the above captioned petition, pursuant to Section 1.405(a) of the Commission's Rules, 47 C.F.R. § 1.405(a). In its petition, the Utilities Telecom Council ("UTC") requests that "the Commission commence a proceeding to amend Parts 2 and 101 to permit shared, secondary terrestrial fixed service use of the 14.0–14.5 GHz band for critical infrastructure industry communications". In particular it invites the Commission to commence proceedings to establish rules for secondary use of the 14.0–14.5 GHz band by fixed point-to-point, point to multipoint, and temporary fixed stations. These rules would amongst other things put measures in place to ensure that "the proposed FS services do not interfere with incumbent operations in the band" and that frequency coordination is performed in respect to incumbent operations in the bands.

As explained below, SUIRG opposes the UTC petition and urges the Commission not to allow secondary terrestrial use of the 14-14.5 GHz band. The UTC fails to show compellingly that the proposed UTC operations will not cause unacceptable interference to incumbent operations in the band. The UTC provides a flawed analysis suggesting that millions of UTC terminals can be operated without a problem. However, analysis conducted within the satellite industry indicates that such use will cause unacceptable levels of interference into GSO FSS operations. Furthermore such use will expose the UTC terminals to interference that will be incompatible with the critical nature of the services that are intended in the proposed new secondary terrestrial allocation

II. BACKGROUND

The Satellite Users Interference Reduction Group, Inc. (SUIRG) is a global industry organization dedicated to finding ways of mitigating the increasing and costly problem of satellite radio frequency interference (RFI). Comprised of representatives from both private industry and the public sector, SUIRG shares and disseminates RFI information and remedies, works with the satellite industry to define equipment standards for future equipment designs along with proficiency training. Finally, SUIRG's overall objective is to actively pursue programs to reduce or mitigate satellite interference before it begins.

Incorporated as a non-profit trade association, SUIRG combines the collective strength and technical capability of its member base to achieve what no single company can do alone regarding the mitigation of the growing problems of satellite interference. SUIRG's Founding Members are Intelsat, PanAmSat (now part of Intelsat), NewSkies Satellites (now part of SES), Glowlink (a past member), QinetiQ, and Inmarsat. Full membership is comprised of 30 organizations from 19 countries which include international satellite operators plus several users and satellite equipment suppliers.

III. DISCUSSION

A. The proposed secondary status requested for the UTC terminal is incompatible with the intended use of the spectrum for critical communication systems

The petition suggests that the requested spectrum would be used principally to "operate critical communications systems and networks that enable the safe, reliable and efficient delivery of essential water, gas, electric and other energy services to the public at large".

The conditions for operating stations in the secondary service, per Section part 2.105 of the FCC rules[1] indicate that they (i) Shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date; and (ii) Cannot claim protection from harmful interference from stations of a

[1] C.F.R 47

primary service to which frequencies are already assigned or may be assigned at a later date.

The above conditions imply that terrestrial terminals operating per the terms of the petition will not be entitled to protection from interference and thus subject to interference from FSS terminals, as there is an extensive deployment of individually registered terminals, VSATs and transportable terminals in the 14-14.5 GHZ band. Operations under such conditions would put at risk facilities used for "vital control and monitoring of critical assets", potentially jeopardize "important safety, emergency response and homeland security goals" and endanger lives. Indeed FSS terminals can be deployed anywhere and at anytime, on land or on ships, and even on trains and air planes possibly in the future. This makes it hard to know with accuracy the location of earth stations that may at anytime be operated in the 14-14.5 GHz band, thus rendering implementation of some mitigation techniques impractical.

The nature of a secondary allocation is inherently incompatible with safety service operation, and the important public policy goals that are sought by the UTC in their petition will be greatly jeopardized by the proposed secondary allocation in the 14-14.5 GHz band. As such SUIRG respectfully requests that the Commission deny the UTC petition to allow these safety services in the 14-14.5 GHz, even or especially with a secondary status.

B. The proposed approach of designating a nationwide licensee to manage the spectrum that would be allocated to UTC is problematic

The petition recommends designating a nationwide critical infrastructure industries (CII) licensee who would be permitted to enter into a spectrum lease to allow preemptible non-CII use of the band by third parties. SUIRG is concerned with the petitioners proposal to sub-lease the bandwidth to a third party entity and then have them manage the CII interface with the satellite industry and task them to prevent interference. Not withstanding SUIRG's opposition of the UTC petition as a whole, SUIRG is against consideration of such an approach for spectrum licensing.

C. UTC use of the 14-14.5 GHz will put at risk emergency communication services provided by FSS networks

The UTC considers that the opportunity to allocate the 14-14.5 GHz for use by its communications systems is “extremely important to permit its members to serve important public safety, emergency response and homeland security goals”. This consideration fails to recognize that the emergency communication services that the UTC is seeking to provide are already being provided by FSS networks. During the disastrous events that occurred as a result of the Hurricane Katrina for example, satellite communications were used for various emergency relief operations. Requesting for a secondary terrestrial allocation in order to unreliably provide critical services that are already being reliably provided using satellites is unnecessary and would put both services in jeopardy due to interference. This in SUIRG’s view is another reason for the commission to deny the UTC petition.

D. The 14-14.5 GHz will not suitably satisfy the stated additional spectrum needs of CII entities

The UTC petition indicates that “the CII industries need access to additional spectrum to ensure the reliability and continued growth of their communications systems. At present, CII entities use spectrum in several licensed and unlicensed bands, but these bands are plagued by congestion and interference and are insufficient to meet the growing spectrum needs — especially for high-speed data — of CII entities. Given the spectrum needs described above, CII entities need access to dedicated, nationwide spectrum, particularly for point-to-multipoint use for broadband applications.”

The 14-14.5 GHz band does not satisfy the above spectrum requirements specified by the UTC in its petition. The UTC communication networks as proposed will be unreliable due to interference from ubiquitously deployed FSS terminals. This spectrum will not be dedicated to UTC communications. Rather it will be shared with FSS networks on a secondary basis, and will not be entitled to interference protection from existing or future FSS communication networks operating in the 14-14.5 GHz band. In fact, the 14-14.5 GHz band would likely be more plagued with interference in respect to UTC terminals than the other licensed and unlicensed bands used by CII entities, in which they presumably are entitled to some

protection. Thus, the 14-14.5 GHz band is not suitable to accommodate the spectrum needs of the UTC.

E. UTC terminals operating under secondary allocation as proposed will be subject to a considerable amount of interference from primary users of the band

FSS and other primary incumbent services in the band would neither be required to protect nor to coordinate with UTC terminals operating as part of a secondary service. The proposal to use the 14-14.5 GHz band on a secondary basis will expose UTC terminals to large levels of interference that are inherently incoherent with their critical nature. There indeed will be no possibility to coordinate the UTC operations with the primary users of the band.

The effectiveness of the main mitigation technique (Orthogonal Frequency Division Modulation based) identified in the UTC proposal is questionable, especially in view of the flawed assumptions used concerning the characteristics of current or future FSS systems, the assumed bandwidth in particular. The viability of the other interference mitigation techniques is still to be determined, as the UTC does not provide supporting data regarding the efficiencies both in throughput and delay performance that are achievable.

F. The effectiveness of the proposed interference mitigation techniques is questionable

The petition suggests that the CII Coordinator coordinate sharing with mobile stations in this 100MHz band using interference avoidance techniques such as cognitive radio to sense the spectrum and avoid frequencies being used by mobile operators in the area. However, this technique of sensing the spectrum is ineffective where there are TDMA or SCPC systems because there is no carrier present unless there is active communications.

Similarly use of spread spectrum techniques, as suggested in the petition, to mitigate narrowband interference in the environment, has a considerable downside. Use of spread spectrum techniques by the UTC terminals transmitting in the 14-14.5 GHz will increase the noise floor in the band, thus reducing the C/N level of other services operating in the band, in the FSS transponders in particular, resulting in increased bit errors or lower Quality of

Service.

Finally, in order to reduce the overloading effects of large interfering signals, the petitioner recommends the first step would be to limit the input bandwidth of the receiver to its actual occupied bandwidth with a high Q cavity filter. For narrow band interferers within the usable pass-band, a tunable cavity notch filter could be employed to reduce their levels to well below the overload point of either the LNA or the following mixer. The technical report discusses LNA overload of FSS into FS however does not discuss FS into FSS. A second concern is the approach discussed identifies installing a very expensive high Q cavity filter between the feed and the receive amplifier which would not be practical for VSAT terminals as they typically utilize LNB systems therefore there is no location where the filter could be installed. The tunable cavity filter is also a very expensive approach and is impractical for installed systems.

G. The UTC Proposal Does Not Adequately Protect Primary FSS Uplinks

The technical report included with UTC's petition is based on an allowable interference level into FSS uplinks that is inconsistent with the proposed secondary status of the UTC terminals. Specifically, the technical report relies on an interference threshold based on a $\Delta T/T$ of 6%. However, this interference threshold does not apply to secondary transmissions. Instead the applicable interference allowance would be only a fraction of 1% as stipulated in ITU-R Recommendation S.1432, which allows for an aggregate interference of 1% for all non-primary sources.

Table 1 below contains results of analysis of interference from the proposed UTC terminals into FSS uplinks, taking into account the above consideration. These results indicate that the total number of UTC transmitters that could be accommodated in the 14-14.5 GHz would be as little as 10 units. This number is in stark contrast with the millions of units that the analysis reported in the UTC petition suggests can be accommodated in this band.

The results reported in Table 1 assumes that the terrestrial antenna has a 20 dB gain discrimination in the direction of the FSS satellite, which corresponds to the minimum radiation suppression for angles 5 to 10 degrees from centerline of main beam, defined in

part 101 of the FCC rules for antennas in the frequency range of interest.

It also considers terrestrial units located in the -1 dB contour of a Ku band satellite with a peak gain of 35 dBi, and a noise temperature of 500° K. These values are typical of CONUS satellites operating in the Ku band.

For the purposes of this example interference analysis, a value of 0.5% has been used for the interference to noise allowance for the UTC terminals in respect to the FSS, consistent with the levels recommended in ITU-R Recommendation S.1432 for secondary sources of interference into an FSS link. This interference allowance is generous compared to that which would result from an equitable allocation of the 1% aggregate allowance (as stipulated in Recommendation 1432) to all secondary interference sources, at least in some portions of the 14-14.5 GHz. Indeed in part of the band, as many as four secondary services, Federal and non-Federal, would be considered in apportioning the 1% aggregate interference allowance, amounting to an interference to noise ratio allowance of 0.25% for an individual secondary service.

The results in Table 1 also suggest that even when the best case scenario for the configuration of the UTC terminals, in respect to the FSS earth and space stations is considered, the theoretical maximum number of UTC terminals would be 972 units. In this optimistic scenario, the UTC transmitting antenna radiation suppression from centerline of main beam is assumed to be 35 dB for all units, and the terrestrial units are located near the CONUS borders, in the -6 dB contour of the Ku band satellite receive beam.

Notwithstanding the above, the actual number of UTC terminals that could be accommodated would be less than 10 for the more conservative scenario, and less than 972 for the more optimistic scenario, when taking into consideration the exclusions zones around licensed FSS earth stations, necessary to ensure that the UTC units will not be interfered with by FSS transmitting earth stations. For example, the distribution of individually licensed earth stations severely limits the ability to have any UTC terminals in the eastern part of the United States, further limiting the total number of UTC terminals that could be accommodated in the 14-14.5 GHz band.

Table 1. Results of technical analysis on the estimated number of UTC terminals

		Scenario 1	Scenario 2	Scenario 3
Path Loss	[dB]	-206.5	-206.5	-206.5
Maximum UTC EIRP density	[dBW/MHz]	18	18	18
UTC transmitting antenna discrimination	[dB]	20	23	35
FSS satellite antenna peak gain	[dBi]	34	35	35
FSS satellite antenna discrimination	[dB]	0	6	6
FSS satellite received Interference Power	[dBW]	-147.5	-155.5	-167.5
FSS satellite antenna noise temperature	[K]	500	500	500
Boltzmann constant		1.38E-23	1.38E-23	1.38E-23
FSS satellite antenna total noise		-124.62	-124.622	-124.62
Interference to Noise ratio seen at the FSS satellite		-22.88	-30.88	-42.88
Interference to Noise ratio objective for the FSS uplink		-23	-23	-23
Interference to Noise margin to objective		-0.12	7.88	19.88
Number of UTC units per 50 MHz		1	6.1	97.2
Total number of UTC Units for all 500 MHz		Less than 10	Less than 61	Less than 972

The analysis also implies that the millions of terminals which the UTC proposes to operate in the 14-14.5 GHz would unduly interfere with FSS operations. Regrettably, FSS operations will not be adequately protected from interference from the UTC operations as proposed, and the key objective set forth in this petition, to ensure that “the proposed FS services do not interfere with incumbent operations in the band”, will not be met. The UTC petition fails to meet its own standard for establishing the merit of its petition, and the commission should deny this petition.

IV. CONCLUSION

SUIRG fully supports the goal to protect existing FSS operators from harmful interference from UTC communication terminals. The global interference problem is steadily increasing, satellite operators expend millions of dollars annually specifically related to the satellite interference, and SUIRG’s primary mission is to assist in combating this growing threat to satellite communications.

SUIRG supports the concept of ensuring safe and reliable operation of critical communications systems and networks that enable “the safe, reliable and efficient delivery of essential water, gas, electric and other energy services to the public at large”, to the extent that existing and future FSS services will not be subject to an unacceptable increase in interference.

SUIRG’s evaluation of the UTC proposal indicate that use of the 14-14.5 GHz Ku band for use by their CII communication networks as proposed in the petition would subject commercial and critical FSS communications to unacceptable levels of interference. On the other hand, the UTC community will not necessarily achieve their intended purpose for the spectrum sought, as UTC communication operations in the 14-14.5 GHz would be unreliable due to interference from FSS and other sources.

In several areas, the UTC petition fails to meet its own standard for establishing the merit of its petition. Therefore SUIRG respectfully urges the commission to deny the UTC petition.

Respectively submitted

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CERTIFICATE OF SERVICE

I, Robert W. Ames, do hereby certify that on June 26, 2008, I served a copy of the Opposition of the Satellite Users Interference Reduction Group upon the following parties by postal and email:

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